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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Paper No. 19

Application Number: 09/333,121
Filing Date: June 14, 1999
Appellant(s): PALMER ET AL.

David Lewis
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed October 23, 2003.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is correct.

(7) Grouping of Claims

Appellant's brief includes a statement that the claim groupings do not stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

5,835,905	PIROLLI ET AL.	11-1998
5,960,422	PRASAD	9-1999
6,389,436	CHAKRABARTI ET AL.	5-2002
6,128,606	BENGIO	10-2000

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-14, 17-19, and 26-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Number 5,835,905 to Pirolli et al. (hereinafter "Pirolli"), issued November 10, 1998, filed April 9, 1997, in view of U.S. Patent Number 5,960,422 to Prasad (hereinafter "Prasad"), issued September 28, 1999, filed November 26, 1997.

Regarding **independent claim 1**, Pirolli does not disclose establishing a plurality of training sets wherein each training set is associated with a category and includes training documents that have been classified as belonging to said associated category. However, Prasad does make such a disclosure. (Prasad, col. 4, lines 17-21: "In order to use Rule-based Induction a set of training documents 24 is collected from each source 20. The training set 24 is created by a random set of documents from each source, typically about 90% of the documents with the remaining 10% of the documents forming a test set 26.") Further, Prasad provided

motivation to follow his teaching by explaining that it would enable searches that were more likely to satisfy a user query. (Prasad, col. 2, lines 50-67.) Therefore, it would have been obvious to one of ordinary skill in the art to have established a plurality of training sets wherein each training set is associated with a category and includes training documents that have been classified as belonging to said associated category.

Further, Pirolli discloses determining how strongly each document corresponds to each of the categories by determining similarity between each document and a set of criteria established for the category. (Pirolli, col. 8, lines 8-47.) Pirolli does not disclose determining similarity between each document and the training documents that belong to the training documents that belong to the training set of each category. However, one of ordinary skill in the art would have recognized that using sets of training documents to automatically define categories would have provided the benefit of basing criteria on documents actually taken from the category which, Prasad explains (as noted in the preceding paragraph), would have provided more accurate search results. Therefore, it would have been obvious to one of ordinary skill in the art to extend Pirolli with Prasad's teaching of using training documents.

Further, Pirolli discloses the step of determining similarity performed using a matrix representing document similarity that is derived by combining two or more measures of document similarity. (Pirolli, col. 11, lines 36-39: "An activation network can be represented as a graph defined by matrix R, where each off-diagonal element $R_{i,j}$ contains the strength of association between nodes i and j, and the diagonal contains zeros."; col. 8, lines 8-13: "In order to perform categorizations each Web page at the Web locality is represented by a vector of features constructed from the above topology, meta-information, usage statistics and paths, and text similarities. These Web page vectors are collected into a matrix. Such a matrix is illustrated in FIG. 5.")

Regarding **dependent claim 2**, Pirolli discloses the measures of document similarity including hyperlink similarity inasmuch as Pirolli teaches that the matrix contains "inlinks, the number of hyperlinks that

point to the item from the web locality (column 504) [and] outlinks, the number of hyperlinks the item contains that point to other items in the web locality (column 505)." (Pirolli, col.8, lines 19-23; Fig. 5.)

Regarding **dependent claim 3**, Pirolli discloses documents considered similar to each other when there is a link from one to the other, or when the two documents link to, or are linked to by, a set of other associated documents inasmuch as Pirolli teaches that the matrix contains "inlinks, the number of hyperlinks that point to the item from the web locality (column 504) [and] outlinks, the number of hyperlinks the item contains that point to other items in the web locality (column 505)." (Pirolli, col.8, lines 19-23; Fig. 5.)

Regarding **dependent claim 4**, Pirolli discloses certain hyperlinks having greater or lesser similarity weight than other hyperlinks based on other features of the links or their source or destination documents inasmuch as Pirolli teaches "an approach based on weighted linear equations that define the rules for predicting degree of category membership for each page at a web locality. That is, equations are of the form

(1) $c_i = w_1 v_1 + w_2 v_2 + \ldots + w_n v_n$

for all pages i in a Web locality, where the vj are the measured features of each Web page, and the wj are weights." (Pirolli, col. 8, lines 41-48.)

Regarding **dependent claim 5**, Pirolli discloses the measures of document similarity including a similarity of text of the documents. (Pirolli, Fig. 5.)

Regarding **dependent claim 6**, Pirolli discloses two documents being considered similar based on a comparison of word vectors derived from the text of each of the two documents. (Pirolli, col. 7, lines 57-65 – "The token information is then used to create a document vector, where each component of the vector represents a word, step 403. Entries in the vector for a document indicate the presence or frequency of a word in the

document. The steps 401-403 are repeated for each Web page in the Web locality. For each pair of pages, the dot product of these vectors is computed, step 404. The dot product . . . produces a similarity measure.")

Regarding **dependent claim 7**, Pirolli discloses text similarity determined in part based upon weight values assigned to words of the text, and wherein certain words have greater or lesser weight than other words inasmuch as Pirolli teaches that "entries in the vector for a document indicate the presence or frequency of a word in the document." (Pirolli, col. 7, lines 59-61.)

Regarding **dependent claim 8**, Pirolli discloses the measures of document similarity including user click-through similarity inasmuch as Pirolli teaches that one "kind of graph[], or network[], . . . used to represent strength of associations among Web pages [is] the usage paths, or flow of users through the locality." (Pirolli, col. 10, lines 59-60; Fig. 11.)

Regarding **dependent claim 9**, Pirolli discloses documents associated by frequency of clicks inasmuch as Pirolli states that "[r]eferring now to FIG. 13, for the matrix representation of usage path networks, an entry of an integer strength, s >=0, in column i row j, indicates the number of users that traversed from page i to page j." (Pirolli, col. 11, lines 30-34. *See also* Pirolli, col. 7, lines 15-18 – "From the set of paths, a vector that contains each page's frequency of requests is generated (i.e. a frequency vector), step 304, along with a path matrix containing the number of traversals from one page to another, step 305.")

Regarding **dependent claim 10**, Pirolli discloses deriving measures of document similarity from patterns detected in user viewing of the documents inasmuch as Pirolli teaches use of "raw data [that] may be obtained from usage records or access logs of the web locality and by direct traversal of the Web pages in the Web locality" (Pirolli, col. 4, lines 57-60), and further states that "[t]he raw data is comprised of topology information, page meta-information, page frequency path information and text similarity information. . . .

Usage frequency and path information indicate how many times a Web page has been accessed and how many times a traversal was made from one Web page to another." (Pirolli, col. 5, lines 2-10.)

Regarding **dependent claim 11**, as discussed above regarding dependent claim 10, Pirolli discloses user viewing information monitored by a web caching system and stored in a log.

Regarding **dependent claim 12**, Pirolli discloses documents being considered similar based on frequency of viewing inasmuch as Pirolli states that "[r]eferring now to FIG. 13, for the matrix representation of usage path networks, an entry of an integer strength, s >=0, in column i row j, indicates the number of users that traversed from page i to page j." (Pirolli, col. 11, lines 30-34. *See also* Pirolli, col. 7, lines 15-18 – "From the set of paths, a vector that contains each page's frequency of requests is generated (i.e. a frequency vector), step 304, along with a path matrix containing the number of traversals from one page to another, step 305.")

Regarding **dependent claim 13**, Pirolli does not disclose measures of document similarity including URL similarity. However, Pirolli suggests using URL similarity as a measure of document similarity inasmuch as Pirolli teaches that the format and structure of documents' URLs as well as particular words found in documents' URLs might mean that the documents belong in the same category. (Pirolli, col. 9, lines 17-20, 24-28.) Therefore, it would have been obvious to one of ordinary skill in the art to have modified Pirolli to have used measures of document similarity including URL similarity.

Regarding **dependent claim 14**, Pirolli does not disclose considering two documents similar if a URL of each document contains similar URL sub-components. However, Pirolli suggests considering two documents similar if a URL of each document contains similar URL sub-components inasmuch as Pirolli teaches that particular words found in documents' URLs might mean that the documents belong in the same category. (Pirolli, col. 9, lines 24-28.) Therefore, it would have been obvious to one of ordinary skill in the art to have

modified Pirolli to have considered two documents similar if a URL of each document contains similar URL sub-components.

Regarding **dependent claim 17**, Pirolli does not disclose achieving the combination of two or more measures of document similarity by taking the union of each of a plurality of graphs, each graph describing one of the measures of document similarity, to compute a combined graph that describes the combined document similarity. However, Pirolli suggests taking such a union inasmuch as Pirolli states that "three kind of graphs, or networks, are used to represent strength of associations among Web pages: (1) the hypetext [*sic*] link topology of a Web locality, (2) inter-page text similarity, and (3) the usage paths, or flow of users through the locality. Each of these networks or graphs is represented by matrices in our spreading activation algorithm." (Pirolli, col. 10, lines 56-63.) Therefore, it would have been obvious to one of ordinary skill in the art to have modified Pirolli to have taken such a union of a plurality of graphs.

Regarding **dependent claim 18**, Pirolli does not disclose achieving the combination of two or more measures of document similarity by taking the intersection of each of a plurality of graphs, each graph describing one of the measures of document similarity, to compute a combined graph that describes the combined document similarity. However, Pirolli suggests combining graphs inasmuch as Pirolli states that "three kind of graphs, or networks, are used to represent strength of associations among Web pages: (1) the hypetext [*sic*] link topology of a Web locality, (2) inter-page text similarity, and (3) the usage paths, or flow of users through the locality. Each of these networks or graphs is represented by matrices in our spreading activation algorithm." (Pirolli, col. 10, lines 56-63.) Pirolli suggests that this combination could be an intersection inasmuch as Pirolli teaches that association strength can be zero, effectively meaning that a portion of a graph would be excluded from the combination. (Pirolli, col. 11, lines 1-34.) Therefore, it would have been obvious to one of ordinary skill in the art to have modified Pirolli to have taken such an intersection of a plurality of graphs.

Regarding **dependent claim 19**, insofar as that claim can be understood, Pirolli discloses extracting structural information from the similarity matrix to obtain new documents supported by the set of training documents for each category inasmuch as Pirolli teaches extracting information from matrix structures and using a spreading activation technique to "define the degree of predicted relevance of Web pages to the starting set of focus Web pages." (Pirolli, col. 10, lines 8-35.)

Regarding **dependent claim 26**, Pirolli discloses categories coming from a manually derived taxonomy inasmuch as Pirolli states that "for the classification of Web pages in the web locality, classification characteristics are provided, step 103. The classification characteristics are predetermined "rules" which are applied to the feature vectors of a page to determine the category of the page. For example, it may be desirable to have a classification of web pages as index types (contain primarily links to other pages) or content types (contain primarily information)." (Pirolli, col. 5, lines 12-19.)

Regarding **dependent claim 27**, Pirolli does not disclose categories derived from logs of user queries. However, Pirolli does suggest such a step inasmuch as Pirolli teaches that one of the three general sorts of information determine the need probabilities of information in memory, given a current focus of attention [is] . . . past usage patterns" (Pirolli, col. 4, lines 34-35), and further explains that such usage patterns are found in "usage records or access logs of the web locality." (Pirolli, col. 4, lines 58-59.) Therefore, it would have been obvious to one of ordinary skill in the art to have extended Pirolli to have derived categories from logs of user queries.

Regarding **dependent claim 28**, Pirolli does not disclose creating and storing the matrix using columns representing documents and rows representing user sessions wherein values of elements of the second matrix represent interest in a document shown by a particular user in a particular session. However, Pirolli does teach

creating and storing information about the number of times a document was requested within a given time period (Pirolli, col. 8, lines 24-25) and also suggests tracking user usage patterns (Pirolli, col. 4, lines 34-35), which suggests creating and storing a value that is the function of the amount of time a user spent viewing a document associated with a particular session. Therefore, it would have been obvious to one of ordinary skill in the art to have extended Pirolli to have created columns representing documents and rows representing user sessions wherein values represent interest in a document shown by a particular user in a particular session.

Regarding **dependent claim 29**, Pirolli does not disclose creating and storing the matrix using rows representing documents and columns representing user sessions wherein values of elements of the second matrix represent interest in a document shown by a particular user in a particular session. However, Pirolli does teach creating and storing information about the number of times a document was requested within a given time period (Pirolli, col. 8, lines 24-25) and also suggests tracking user usage patterns (Pirolli, col. 4, lines 34-35), which suggests creating and storing a value that is the function of the amount of time a user spent viewing a document associated with a particular session. Therefore, it would have been obvious to one of ordinary skill in the art to have extended Pirolli to have created rows representing documents and columns representing user sessions wherein values represent interest in a document shown by a particular user in a particular session.

Regarding **dependent claim 30**, Pirolli does not disclose element values computed as a function of a time that a user has spent viewing a document associated with each element. However, Pirolli does teach creating and storing information about the number of times a document was requested within a given time period (Pirolli, col. 8, lines 24-25) and also suggests tracking user usage patterns (Pirolli, col. 4, lines 34-35), which suggests creating and storing a value that is the function of the amount of time a user spent viewing a document associated with a particular session. Therefore, it would have been obvious to one of ordinary skill in the art to have extended Pirolli to have computed element values as a function of a time that a user has spent viewing a document associated with each element.

Regarding **dependent claim 31**, Pirolli discloses creating and storing a second matrix representing a Similarity between pairs of documents i and j wherein the second matrix is derived by comparing pairs of column vectors or row vectors respectively i and j of the first matrix inasmuch as Pirolli teaches generating three matrices representing similarity between documents (Pirolli. col. 10, lines 10-11; Figs. 9, 11, 13) from raw information entered in a first matrix (Pirolli, Fig. 5).

Regarding **dependent claim 32**, Pirolli discloses creating and storing a second matrix representing a Similarity between pairs of documents i and j inasmuch as Pirolli teaches generating three matrices representing similarity between documents (Pirolli. col. 10, lines 10-11; Figs. 9, 11, 13) from raw information entered in a first matrix (Pirolli, Fig. 5). Pirolli does not disclose finding pairs of documents i and j which have high interest values for a particular user in a particular session or period of time. However, Pirolli does teach creating and storing information about the number of times a document was requested within a given time period (Pirolli, col. 8, lines 24-25) and also suggests tracking user usage patterns (Pirolli, col. 4, lines 34-35), which suggests comparing documents based on interest values for a particular user in a particular session of time. Therefore, it would have been obvious to one of ordinary skill in the art to have modified Pirolli to have created the second matrix as recited in claim 32.

Regarding **dependent claim 33**, Pirolli discloses identifying a category of a classification taxonomy of the hypertext system in which a first electronic document is presently classified inasmuch as Pirolli states "for relevancy predictions, one or more Web pages for spreading activation are selected, step 105. The selected Web pages may be based on the category that it is in." (Pirolli, col. 5, lines 34-36.)

Further, Pirolli discloses storing information that classifies the second electronic document into the category if the second electronic document is found to be highly Similar inasmuch as Pirolli states that

"activation is spread using the selected page as a focal point to generate a list of relevant pages, step 106." (Pirolli, col. 5, lines 40-42.)

Regarding **independent claim 34**, Pirolli discloses a computer-readable medium carrying one or more sequences of instructions. (Pirolli, col. 13, lines 24-27.)

Further, the rejection of claim 1 above is fully incorporated herein.

Claims 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pirolli and Prasad in view of U.S. Patent Number 6,282,549 B1 to Hoffert et al. (hereinafter "Hoffert"), issued August 28, 2001, filed March 29, 1999.

Regarding **dependent claim 15**, Pirolli does not disclose measures of similarity including multimedia similarity. Hoffert, however, teaches that the type of multimedia file is relevant to a user querying a database for multimedia files, and teaches the classification of multimedia files with associated icons indicating file type. (Hoffert, col. 23, lines 46-67.) Therefore, it would have been obvious to one of ordinary skill in the art to have modified Pirolli and Prasad to have measures of similarity include multimedia similarity.

Regarding **dependent claim 16**, Pirolli does not disclose considering two documents similar based on features derived from multimedia components linked to or contained by the documents. Hoffert, however, teaches the storage of a variety of multimedia file features for the storage, retrieval, and classification of multimedia documents. (Hoffert, col. 6, lines 10-32.) Therefore, it would have been obvious to one of ordinary skill in the art to have modified Pirolli and Prasad to consider two documents similar based on features derived from multimedia components linked to or contained by the documents.

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pirolli and Prasad in view of U.S. Patent Number 6,128,606 to Bengio et al. (hereinafter "Bengio"), issued October 3, 2000, filed March 11, 1997.

Regarding **dependent claim 20**, Pirolli does not disclose obtaining structural information by optimizing an objective function. However, Bengio, in disclosing an invention "directed to the problem of developing a modular building block for complex processes that can input and output data in a wide variety of forms, but when interconnected with other similar modular building blocks can be easily trained" (Bengio, col. 2, lines 45-49), teaches "training a network of these modules by back-propagating gradients through the network to determine a minimum of the global objective function." (Bengio, col. 2, lines 57-60.) Because claim 20 is directed to a similar invention, it would have been obvious to one of ordinary skill in the art to have combined Pirolli, Prasad, and Bengio to implement the optimization of an objective function.

Claims 21-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pirolli and Prasad in view of U.S. Patent Number 6,389,436 to Chakrabarti et al. (hereinafter "Chakrabarti"), issued May 14, 2002, filed December 15, 1997.

Regarding **dependent claim 21**, Pirolli does not disclose obtaining structural information by approximately optimizing an objective function. Chakrabarti, however, in the context of a document classifier similar to the invention of claim 21, discloses optimizing an objective function by "relaxation labeling" in which "[t]he iteration continues until a stopping criteria is reached." (Chakrabarti, col. 19, lines 17-20.) Therefore, it would have been obvious to one of ordinary skill in the art to have combined Pirolli, Prasad, and Chakrabarti to have obtained structural information by approximately optimizing an objective function.

Regarding **dependent claim 22**, neither Pirolli nor Chakrabarti discloses repeated application of a growth transformation. However, given that a growth function is one which by definition stabilizes in a finite number of steps, it would have been obvious for one of ordinary skill in the art to have extended the combination of Pirolli, Prasad, and Chakrabarti to repeatedly apply a growth transformation.

Regarding **dependent claim 23**, Pirolli does not disclose creating and storing a second matrix that represents an interim score for each document in each category. However, Chakrabarti teaches a technique of soft classification in which "after each iteration, all documents are assigned a vector containing estimated probabilities of belonging to each class." (Chakrabarti, col. 19, lines 27-29.) Therefore, it would have been obvious to one of ordinary skill in the art to have combined Pirolli, Prasad, and Chakrabarti to have created and stored a second matrix that represents an interim score for each document in each category.

Regarding **dependent claim 24**, Pirolli does not disclose periodically normalizing the rows of the matrix by normalizing within each document, across all categories, whereby the score for one document in a particular category will depend on the scores for that document in other categories. However, Chakrabarti suggests such a step inasmuch as Chakrabarti teaches word vectors containing probabilities in which the score for one document in a particular category inherently depends on the scores for that document in all other categories. (Chakrabarti, col. 6, lines 46-65; col. 19, lines 27-29.) Therefore, it would have been obvious to one of ordinary skill in the art to have combined Pirolli, Prasad and Chakrabarti to have periodically normalized the rows of the matrix as recited in claim 24.

Regarding **dependent claim 25**, Pirolli does not disclose periodically, as the matrix is being computed, normalizing columns of the matrix by normalizing within each category, across all documents, whereby the score for one document in a particular category depends on the scores for all other documents in that category. However, Chakrabarti suggests such a step inasmuch as Chakrabarti teaches word vectors containing

probabilities in which the score for one document in a particular category inherently depends on the scores for that document in all other categories. (Chakrabarti, col. 6, lines 46-65; col. 19, lines 27-29.) Therefore, it would have been obvious to one of ordinary skill in the art to have combined Pirolli, Prasad and Chakrabarti to have periodically normalized the columns of the matrix as recited in claim 25.

(11) Response to Argument

Pages 11-13 of Appellant's Appeal brief (hereinafter the brief) are substantially directed towards an outline of arguments. Beginning on page 13 of the brief, Appellant argues the following specific issues, which are accordingly addressed below.

a. "***The Combination of Pirolli and Prasad Lacks a Teaching of Comparing a Group of Documents to a Group of Documents***" (page 14 to page 18, of the brief).

The examiner respectfully disagrees. Pirolli deals with categorization of documents by creating lists of "similar" types of documents (Pirolli Abstract, column 2 lines 5-10). These documents are used to predict documents relevant to a focus document. Appellant argues that both references use rules for comparisons, instead of comparing documents to documents. It is respectfully noted that the claims do not preclude the use of rules, and that rules are used to help define a degree of predicted relevance between Web pages (i.e. a group of documents) to a starting set of Web pages (i.e. another set of documents) (see Pirolli column 2 lines 32-37).

Pirolli discloses determining how strongly each document corresponds to each of the categories by determining similarity between each document and a set of criteria established for the category. Although Pirolli does not specifically disclose determining similarity between each document and the training documents that belong to the training documents that belong to the training set of each category. However, one of ordinary skill

in the art would have recognized that using sets of training documents to automatically define categories would have provided the benefit of basing criteria on documents actually taken from the category which, Prasad explains would have provided more accurate search results.

Prasad, at column 4, lines 17-21 states: "In order to use Rule-based Induction a set of training documents 24 is collected from each source 20. The training set 24 is created by a random set of documents from each source, typically about 90% of the documents with the remaining 10% of the documents forming a test set 26.".

b. "***Activation of Pirolli is Not a Sub-step of Categorizing***" (page 18 to page 19 of the brief).

The examiner respectfully disagrees. Pirolli discloses determining how strongly each document corresponds to each of the categories by determining similarity between each document and a set of criteria established for the category. (Pirolli, col. 8, lines 8-47). Pirolli also discloses the step of determining similarity performed using a matrix representing document similarity that is derived by combining two or more measures of document similarity. These teachings are used for rejecting the limitations of instant claim 1 (see also instant rejection of claim 1).

c. Page 20 to middle of page 29 of the brief deals substantially with the combination of references used in the rejection of representative claim 1. It is respectfully submitted that both Pirolli and Prasad are from the same general field of endeavor. Both references deal with comparisons for classification purposes, and both references share the same general classification (707/2, 707/3 (optimizing access augmentation/Query processing and searching).

d. Appellant argues on pages 29-36 that the examiner has not shown click-through behavior, forming a graph and showing the intersection of two graphs, as well as not showing motivation. It is respectfully submitted that the art of record (Pirolli) deals with collections of surfed Web pages. Since a typical method of surfing from Web page to Web page is clicking hyperlinks, said teaching provides said click-through behavior. In addition, Pirolli teaches graphs and intersection of graphs. Proper motivation is applied when/where necessary.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

JOSEPH H. FEILD
PRIMARY EXAMINER

William L. Bashore
January 11, 2004

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